

What is claimed is:

1. An apparatus for concentrating a vegetable-fruit product, said apparatus comprising:

5 a concentration unit having an inlet, an outlet and a plurality of tubular membrane modules connected in series;

a single-axis eccentric screw pump connected to said inlet of said concentration unit for supplying the vegetable-fruit product to said concentration unit; and

10 another single-axis eccentric screw pump connected to said outlet of said concentration unit for discharging the vegetable-fruit product from said tubular membrane modules, said apparatus serving to cause the vegetable-fruit product to be concentrated by reverse osmosis by causing the vegetable-fruit product to flow down under a pressured condition to said concentration unit.

15 2. The apparatus of claim 1 structured for causing the vegetable-fruit product to flow into said concentration in a single-pass process.

3. The apparatus of claim 1 wherein the vegetable-fruit product includes at least one selected from the group consisting of seeds, epidermis and sarcocarp.

20 4. The apparatus of claim 2 wherein the vegetable-fruit product includes at least one selected from the group consisting of seeds, epidermis and sarcocarp.

25 5. The apparatus of claim 3 wherein said vegetable-fruit product is a processed tomato product.

6. The apparatus of claim 4 wherein said vegetable-fruit product is a processed tomato product.

30 7. A method of concentrating a vegetable-fruit product by reverse osmosis, said method comprising the steps of:

causing the vegetable-fruit product to flow down under a pressured condition to a concentration unit which comprises an inlet, an outlet and a plurality of tubular membrane modules connected in series;

supplying the vegetable-fruit product to said tubular membrane modules through a single-axis eccentric screw pump which is attached to said inlet; and

discharging a concentrated product from said tubular membrane modules through another single-axis eccentric screw pump which is attached to said outlet.

8. The method of claim 7 wherein said vegetable-fruit product is caused to flow into said concentration unit in a single-pass process.

9. The method of claim 7 wherein the vegetable-fruit product includes at least one selected from the group consisting of seeds, epidermis and sarcocarp as a solid component.

10. The method of claim 8 wherein the vegetable-fruit product includes at least one selected from the group consisting of seeds, epidermis and sarcocarp as a solid component.

11. The method of claim 9 wherein the vegetable-fruit product contains said solid component in an amount of 30-60 weight %.

12. The method of claim 10 wherein the vegetable-fruit product contains said solid component in an amount of 30-60 weight %.

13. The method of claim 11 wherein said reverse osmosis is carried out with pressure of 3-5MPa at said inlet, pressure of 1-3MPa at said outlet and pressure difference greater than 1.5MPa between said inlet and said outlet.

14. The method of claim 12 wherein said reverse osmosis is carried out with pressure of 3-5MPa at said inlet, pressure of 1-3MPa at said outlet and pressure difference greater than 1.5MPa between said inlet and said outlet.

5 15. The method of claim 13 wherein said vegetable-fruit product is a processed tomato product.

16. The method of claim 14 wherein said vegetable-fruit product is a processed tomato product.

10

09919170.073004
T00E/0"0276T660